HCal Tile Testing at Colorado

Sebastian Vazquez-Torres
Ron Belmont
Jamie Nagle

University of Colorado, Boulder

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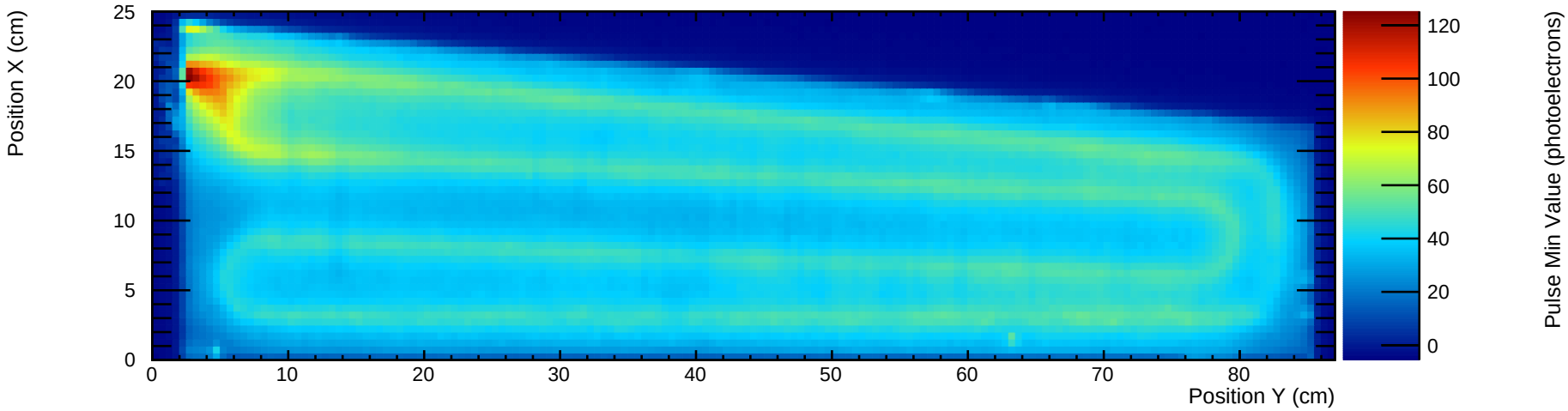
Introduction and Overview

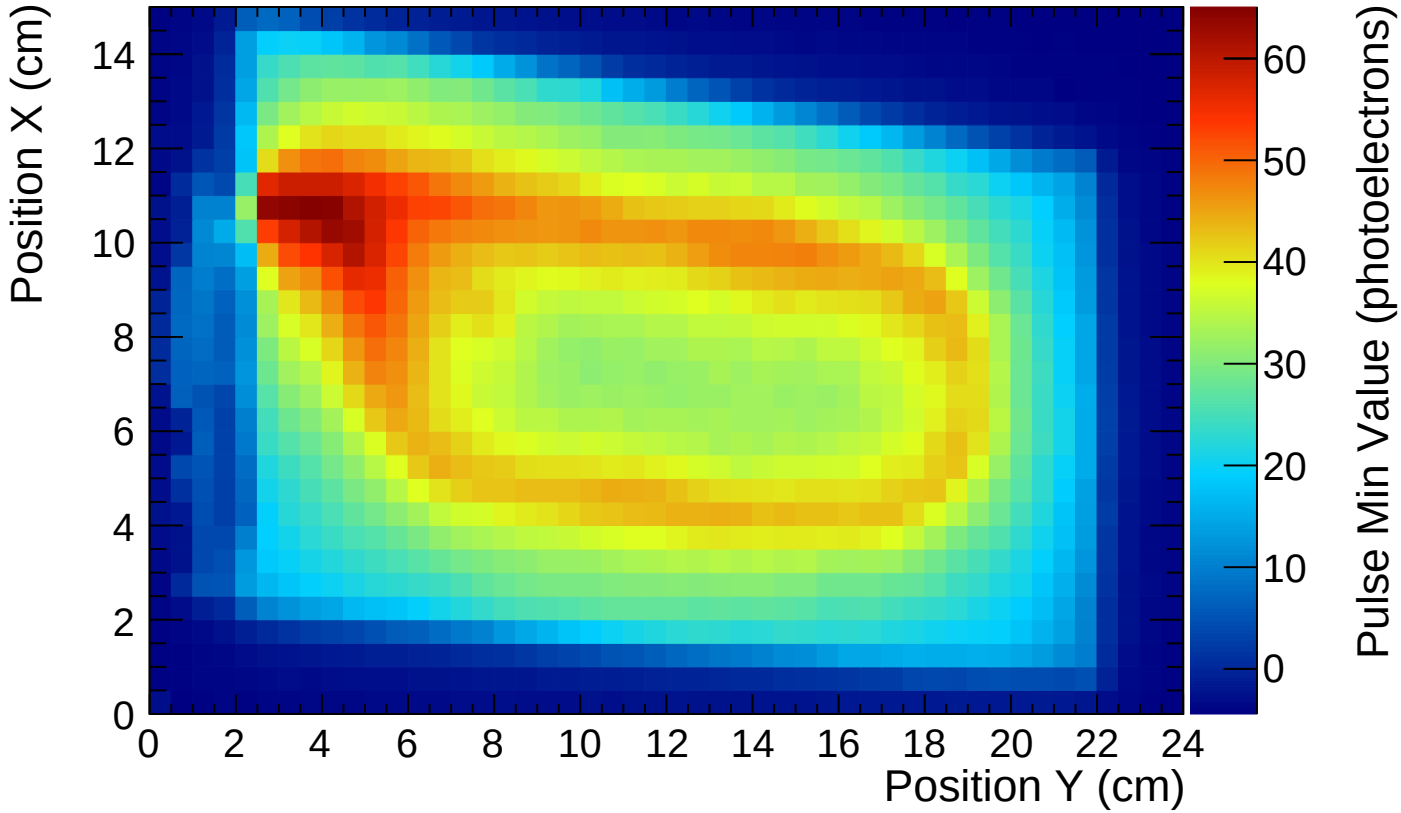
Where have we been?
Where are we going?

LED scan



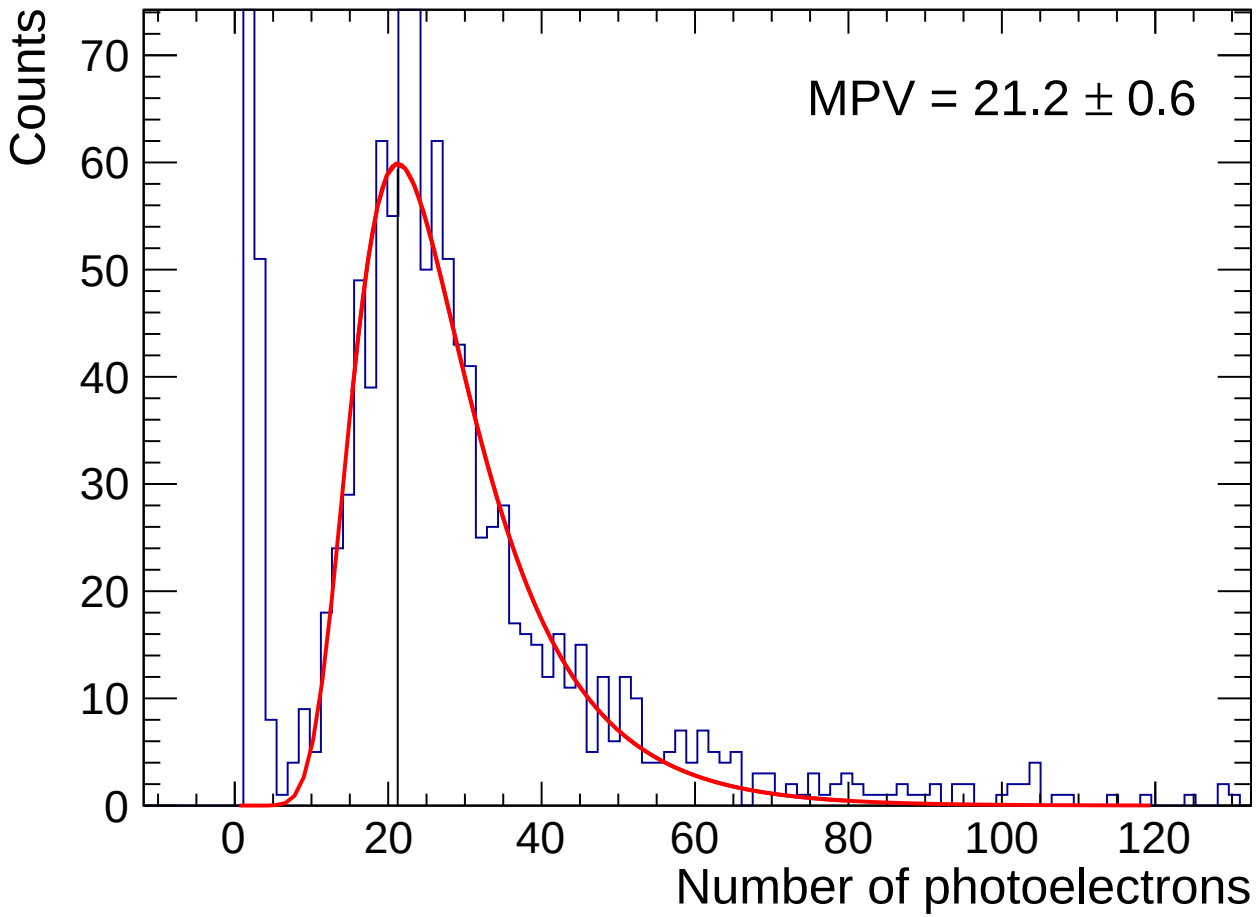
We scan in 0.5 cm increments in both directions
We scan 50 rows and 174 columns, which is slightly bigger than the tile itself

LED scan



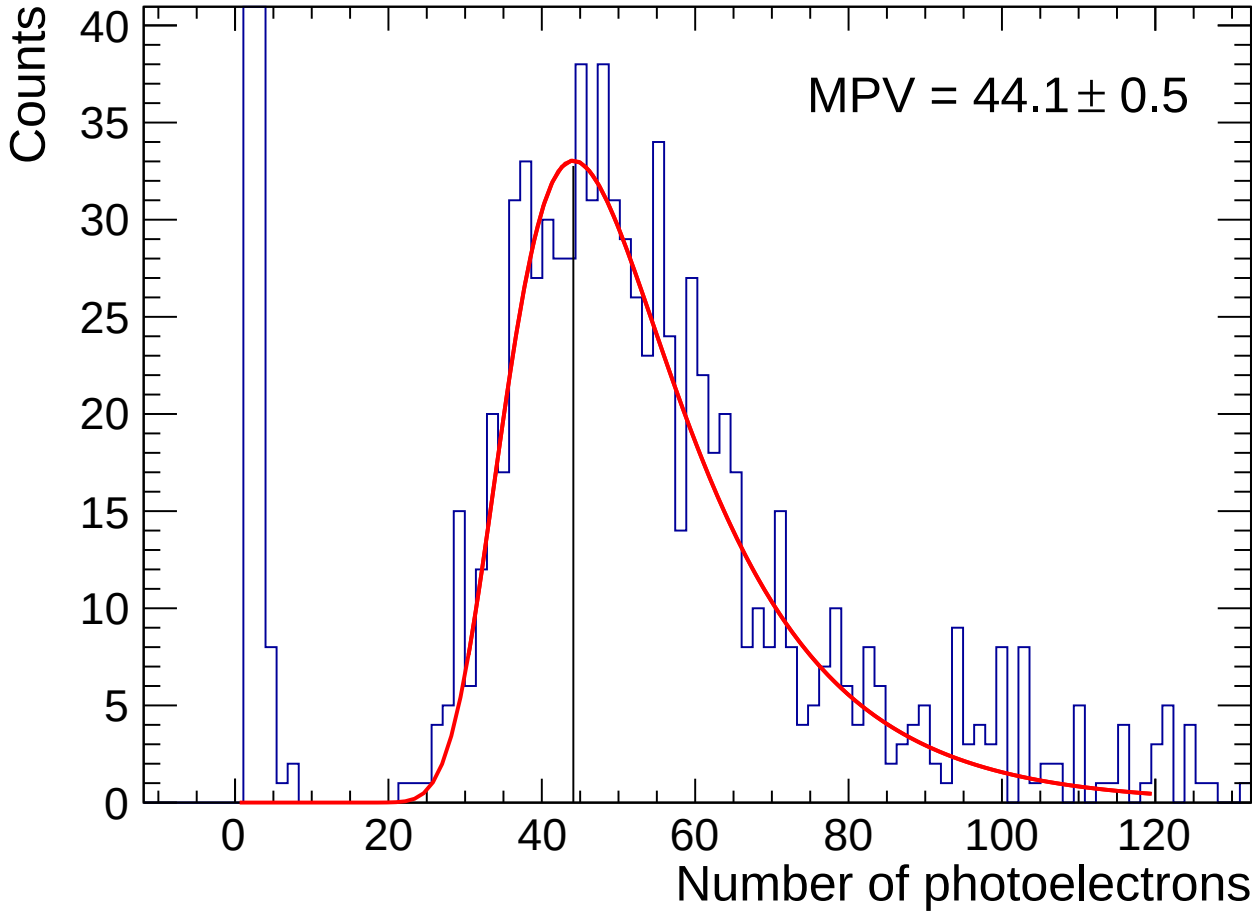
We scan in 0.5 cm increments in both directions
We scan 32 rows and 48 columns, which is slightly bigger than the tile itself

Cosmics



Cosmic trigger in the center of the big tile
$[\Delta E]_{MPV} = 21.6 \pm 0.5$ pe, $\xi = 5.0 \pm 0.3$ pe

Cosmics



Cosmic trigger in the center of the small tile
$[\Delta E]_{MPV} = 43.5 \pm 0.5$ pe, $\xi = 8.0 \pm 0.3$ pe

Summary and Outlook

Further characterization of light response of tile

- Recently purchased 375 nm LED—detailed scans with this will be available in a few weeks, should be interesting to compare to do previous scans with 405 nm
- Shorter wavelength LEDs do exist, though the cost explodes with decreasing wavelength:
  —405 nm = \$0.93
  —375 nm = \$3.41
  —351 nm = \$19.99
  —300 nm = \$212.00
- Possibility for using higher energy beta source (Ruthenium) with very thin ($\approx$1 mm) scintillator, but several big caveats
  —need very high quality PMT
  —need very high quality machining of thin scintillation counter and waveguide
  —very slow processing time, could take many hours even for small tile
  —significant construction and R&D needed before can do processing
  —is it really worth all the effort?
  —input welcome, though personally I'm skeptical...

Summary and Outlook

What's the role for the Colorado group?

- Current arrangment: BNL sends us tiles and we do LED scans and cosmics
- This is great for characterization, modulo furthering our understanding of light response maps from LEDs
- On the other hand, this is terrible for QA—there are 15,360 HCal tiles in sPHENIX, so it's completely impossible to test each tile this way (15,360 hours is 640 days, 15,360 days is 42 years)

So what's next? Colorado group wants to help!